THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

APPLICANT(s):	Ari HEIKKINEN		
SERIAL NO.:	09/871,086	ART UNIT:	2655
FILING DATE:	05/31/2001	EXAMINER:	Vo, Huyen X.
TITLE:	METHOD AND APPARATUS FOR IMPROVED VOICING DETERMINATION IN SPEECH SIGNALS CONTAINING HIGH LEVELS OF JITTER		
ATTORNEY DOCKET NO.:	858-010392-US(PAR)		

RECEIVED
JUN 0 1 2005
U.S. PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS
AND INTERFERENCES

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450
ATTENTION: BOARD OF PATENT APPEALS AND INTERFERENCES

APPELLANTS' BRIEF

This is an appeal from the Final Rejection (dated September 30, 2004) of the claims in the above-identified application. A Notice of Appeal was mailed on March 29, 2005. The fees required under 37 C.F.R. §1.17 are being submitted herewith. The appendix of claims is attached hereto.

06/16/2005 KVESTAL 00000001 09871086
01 FC:1402 500.00 OP

I. REAL PARTY IN INTEREST

The real party in interest in this Appeal is: NOKIA MOBILE PHONES LTD. of Salo, Finland.

II. RELATED APPEALS AND INTERFERENCES

There are no directly related appeals or interferences regarding this application.

III. STATUS OF CLAIMS

Claims 1-18 are pending in the application.

Claims 1-18 have been finally rejected.

The claims on appeal are claims 1-18.

IV. STATUS OF AMENDMENTS

A response to the Final Rejection was filed without amendment of the claims, the response providing an argument showing patentability of the claims.

Thereafter, an Advisory action (dated January 19, 2005) and a corrected Advisory action (dated February 4, 2005) were issued, and stated that the rejections based on prior art are maintained.

Following the Advisory actions, a Supplemental Response to the Final Rejection was filed without amendment of the claims, the response providing an argument showing patentability of the claims.

Thereafter, an interview with the examiner was conducted by telephone on April 11, 2005. Applicant's report on the substance of the interview accompanies this Brief.

V. SUMMARY OF CLAIMED SUBJECT MATTER

With reference to the present specification and drawing figures, the present invention relates to a method and to an apparatus,

such as a mobile device or a network element, by which a speech signal, formulated from utterances spoken by a speaker, is modified (Fig. 7 at blocks 720, 730 and 735) by use of a periodicity estimate of the speech signal to improve the periodicity of the modified signal, and wherein a voicing parameter is determined from the modified signal so as to enable an encoding (Fig. 7 at block 745) of the modified signal with an encoding method based on the voicing parameter. The encoding takes place, in accordance with different embodiments of the invention, in a speech encoder or coder, or in a speech encoder/decoder.

Further description of the foregoing features of the invention is provided in the specification. Measurement of the periodicity of peaks of the voice signal to determine pitch appears on page 13 at lines 6-10. Determination of the voicing information from the normalized speech, rather than from the original signal, is described on page 9, beginning at line 29, through line 1 of page 10. Definition of pitch cycle is presented on page 10 at lines 11-15. Estimation of normalized pitch is disclosed on page 11 at lines 10-17, and on page 13 at lines 12-13. Modification of the speech signal is disclosed on page 13 at lines 13-16, wherein the modification of the speech signal results in an improvement of the periodicity (line 15). The improvement in periodicity is shown also in Figs. 6a and 6b taken in connection with the text on page 12 at lines 9-23. Types of apparatus employed in the practice of the invention are disclosed on page 7 at lines 7-9, 15-16, and 24, while the method is set forth on page 6, at line 30, through line 5 on page 7.

VI. ISSUES TO BE REVIEWED ON APPEAL

The following issues are treated in this appeal.

1. Whether Claims 1-2 and 8-14 should be rejected under 35 U.S.C. 103 as being unpatentable over Kleijn (US 6,223,151) in view of Griffin (IEEE Publication, namely: IEEE Transactions on Acoustics, Speech, and Signal Processing, Vol. 36, No. 8, August 1988, pages 1223-1235; Griffin, Lim: Multiband Excitation Vocoder).

2. Whether Claims 3-5 and 7 should be rejected under 35 U.S.C. 103 as being unpatentable over Kleijn (US 6,223,151) in view of Griffin (IEEE Publication) and Kleijn (US 5,517,595).

3. Whether Claims 15-18 should be rejected under 35 U.S.C. 103 as being unpatentable over Kleijn (US 6,223,151) in view of Griffin (IEEE Publication) and Kleijn (US 5,517,595).

4. Whether Claim 6 should be rejected under 35 U.S.C. 103 as being unpatentable over Kleijn (US 6,223,151) in view of Donovan (US 6,266,637).

VII ARGUMENT

As set forth in the Final Office Action, the examiner rejected claims 1-2 and 8-14 under 35 U.S.C. 103(a) as being unpatentable over Kleijn (US 6,223,151) in view of Griffin (IEEE Transactions on Acoustics, Speech, and Signal Processing, Vol. 36, No. 8, August 1988, pages 1223-1235; Griffin, Lim: Multiband Excitation Vocoder), hereinafter referred to as "Griffin". Furthermore, claims 3-5, 7 and 15-18 were rejected under 35 U.S.C. 103(a) as

being unpatentable over Kleijn (US 6,223,151) in view of Griffin, and further in view of Kleijn (US 5,517,595). Furthermore, claim 6 was rejected under 35 U.S.C. 103(a) as being unpatentable over Kleijn (US 6,223,151) in view of Donovan et al. (US 6,266,637). With respect to the rejection of claim 6, it is presumed that the examiner intended to reject the claim on the combination of Kleijn '151 in view of Griffin plus Donovan (US 6,266,637) because Griffin was employed in the rejection of claim 1 from which claim 6 depends.

Thus, the primary reference, Kleijn '151, plus the teaching of Griffin, are employed in the rejections of all of the claims, wherein some of the claims are rejected on the combined teachings of Kleijn '151 in view of Griffin plus either Kleijn '595 or Donovan.

The following analysis and argument are presented to overcome the foregoing rejections, and to show the presence of patentable subject matter in the present claims.

Kleijn '151 discloses a method for preprocessing the speech signals before speech encoding. The purpose is to divide the signal into blocks in which the signal has a relatively low power at the beginning and at the end of a block. A residual signal is created by linear prediction, and is fed to the encoder. One rule, in creation of the blocks, is placing the pitch pulse near the block center. In the method, the peaks of the fundamental frequency of the voice signal in the time domain are examined and the pitch period is estimated. A first set of refined cycles are determined for the signal by maximizing the cross correlation of the two adjacent cycles in the time domain.

After that a second set of refined cycles is created where the peak is transferred to the center of the cycle. The first and second sets of refined cycles are concatenated and transferred into a linear prediction filter. The filtered signal and the borders of the cycles are fed to the encoder.

In Kleijn '151, modifications for the speech signal are made on the linear-prediction residual of the speech signal. The modifications include sample skipping and repetition, and additionally, changing the limit values of the inspection period of the speech signal (namely, modifying the cycle, not the signal). However, a cycle can be removed or repeated. This is still different than changing the pitch period. In Kleijn '151 the pitch period is estimated and an attempt is made to center the pitch pulse in the middle of a cycle. This differs also from the present invention.

Kleijn '151 modifies a signal to provide a block of a generally sinusoidal signal in which a front end and a back end of the signal block had reduced power while, in a center of the signal block, there was located a pitch pulse. In contrast, in the present invention, the modified signal is a sinusoid with improved periodicity as compared to the original signal wherein periodicity may have been corrupted by jitter.

Griffin discloses a method for calculating a normalized autocorrelation for each harmonic frequency in order to make the voiced/unvoiced decision for each harmonic. The method is based on greater periodicity of a voiced audio signal waveform in the frequency domain compared to an unvoiced audio signal. In other words, in Griffin (referenced by the Office Action at page 3,

lines 11-12), a voiced/unvoiced decision is made by comparing the normalized error of each harmonic to a set threshold. If the threshold is exceeded, noise energy is included in that frequency band and thus the harmonic component (or the specific frequency band) is decided to be unvoiced. Griffin (Office Action at page 3, lines 12-14) further discloses that the coding method of the audio signal phase is dependent on the harmonic's voiced or unvoiced nature (the phase is not coded when the harmonic is unvoiced). It is noted that the teachings of Griffin are discussed also in the present specification on page 4, beginning at line 26, through page 5 at line 6.

It is emphasized that, in the teaching of Griffin which is relied upon by the examiner in the rejection of the claims, the coding method of the audio signal amplitude is not affected by the voicing parameter. On the contrary, the voicing parameter affects the number of bits used for expressing the signal amplitude and phase before coding. This teaching of Griffin contradicts the amendatory passages added in the previous response. Therefore, the claims are believed to be allowable without further amendment.

The Griffin reference teaches only that the pitch period is estimated. That can be seen for example in Figure 3 where one step according to Griffin is to "refine initial pitch period". An important feature of the present invention, as set forth in claim 1, with corresponding language appearing in the other independent claims, is the feature of "modifying the formulated signal using the periodicity estimate such that the periodicity is improved". This means that the signal itself is modified and thus, the pitch period is changed.

The Griffin teaching is different from that of the present invention wherein, as noted above, the signal itself is modified with a resulting change in the pitch period. In section III-A of Griffin, which the Examiner refers to, a pitch refinement is explained. At first, a relatively simple method is used for achieving a first estimate of the pitch period. After that, a second algorithm is used for making the pitch period estimate more accurate. The second algorithm is more complex than the first simple method. The accurate pitch period estimate is made for each harmonic component which leads to the fact that a good voicing estimate can be done for each harmonic component in the teaching of Griffin. Thus, the present invention differs significantly from Griffin.

Griffin distinguishes between voiced and unvoiced signals, and obtains accurate estimates of the pitch of each of a plurality of harmonics. Griffin then codes individual ones of the harmonics based on a voiced or unvoiced part of speech. There is no teaching in Griffin of coding based on a voicing parameter as described on page 2 of the present specification.

The present invention, as set forth in the claims, includes the aforementioned modification of a signal to attain improved periodicity, the decision making of the voicing parameter, and the choosing of the encoding method according to the voicing parameter. Thus, the present invention has an inventive step in view of the prior art. However, Griffin states that the phase is encoded only when a segment of speech is classified as voiced. That teaching of Griffin differs significantly from the concept of the present invention.

With respect to a combination of the teachings of Griffin with Kleijn '151, it is observed that the operation of Kleijn '151 providing for a changing of the limit values of the inspection period of the speech signal, combined with Griffin who provides a two step process for making the pitch period estimate more accurate, do not suggest the step of present claim 1 that calls for modifying the formulated signal using the periodicity estimate such that the periodicity is improved. It appears that Griffin is employed by the examiner to show that the two additional steps added by prior amendment ("determining at least one voicing. . . ." and "deciding the encoding. . . ." involve process steps that are known already in the prior art. However, there would be no motivation to combine these two references since the end product differs from the present invention.

Furthermore, with respect to the teaching of Kleijn '151, wherein the examiner (top of page 3 of the Office Action) relies on the passage in Kleijn '151 in columns 7 and 8 to show a step of modifying a formulated signal using a periodicity estimate, it is observed that the cited passage describes a number of mathematical processes performed for analyzing the signal, but provides no teaching of manipulating a signal to accomplish a "modifying of a signal". Therefore, Kleijn '151 considered individually or in combination with Griffin fails to show or suggest the foregoing important step of the present invention.

Kleijn '595 discloses a coding method for a speech signal. A set of parameters describing the signal waveform in a certain time instant is created. The set of parameters defines the first group of signals which are filtered with a high-pass filter.

Thus a second group of signals is achieved where relatively rapidly changing components of the waveform can be monitored as a function of time. The encoding of the speech signal is done based on the second group of signals.

Donovan relates to speech synthesizing. In Donovan the speech signal (namely, sentences) are processed in sliced parts (such as words and phonemes). Previously recorded words and phrases are combined with the words and phrases created by synthesis. The relevant point of Donovan et al. is the use of TD-PSOLA (Time Domain Pitch Synchronous Overlap-Add) as a signal processing algorithm. The algorithm is used for changing the pitch values and signal duration of the speech signal.

The present invention discloses a method for speech signal processing and encoding where the voicing analysis accuracy is improved prior to speech encoding. A high jitter level causes problems in speech encoding. In the present invention the effect of jitter is reduced by changing (normalizing) the pitch cycles in the time domain. The pitch scaling in the time domain is performed with the TD-PSOLA algorithm in one embodiment of the invention. The analysis can be done to the residual signal (the original speech signal subtracted by a linearly predicted signal) or directly to the speech signal. The modified speech signal is used for classifying the signal to a predefined voiced or unvoiced class (the same as calculating the voicing parameter). The encoding method is chosen based on the class, and the signal is encoded according to the chosen method. Thus, the phonemes of the speech signal can be analyzed more effectively in the present invention because the periodicity of the original speech signal improves.

The foregoing divergent teachings of the cited art would not motivate one to combine these teachings and would direct one away from an attempted combination of the teachings of the cited art.

In view of the above, the applicant respectfully submits that the independent claims 1, 8, 12 and 15 are not obvious from the cited references and therefore, they and their respective dependent claims define patentable subject matter.

The foregoing listed issues are discussed below with reference to the foregoing argument.

The foregoing analysis of the cited art is believed to overcome the rejections of claims 1-2 and 8-14 under 35 U.S.C. 103 as being unpatentable over Kleijn (US 6,223,151) in view of Griffin (IEEE Publication, namely: IEEE Transactions on Acoustics, Speech, and Signal Processing, Vol. 36, No. 8, August 1988, pages 1223-1235; Griffin, Lim: Multiband Excitation Vocoder).

It is noted that the application of the Kleijn '151 teachings of the examiner to the present claims (Point 4 of the Final Action) is based in large measure on column 7 (beginning at line 1) and column 8 (through line 44) in conjunction with the right side of Fig. 2 of the reference. There is a step 490 of computing a set of refined cycles (col. 7 at line 4) with an aligning (step 510) of cycles (lines 5 and 8), followed by a further refinement (step 570) of a cycle (line 34). This is followed by time shifts

resulting from modifications that are performed at step 530 (line 61) with further modification and refinement being performed at step 630 (col. 8 at line 18). Finally, a modified speech signal 280 is fed to a speech coder 110 (line 44).

The examiner admits, in the second paragraph of page 3 of the Action, that Kleijn '151 does not disclose the voicing parameter, and relies on Griffin Section III (C) (beginning on page 1228) to teach a voicing parameter. There is no teaching in either Kleijn '151 or Griffin as to where the Griffin circuitry is to connect into the Kleijn '151 system, which connection could be made either at the common input of computers 130 and 160 (Fig. 1 of Kleijn '151) or at the output of filter 250, since a speech signal (the first speech signal being unmodified and the second speech signal being modified) is present at both of these locations.

Each of present independent claims 1, 8 and 12 specifically recite the determination of a voicing parameter based on the modified signal. An important aspect of the present invention is the recognition by the present inventor that a speech signal that has been modified for improved periodicity should be used for determination of a voicing parameter. But this specific claimed feature of the present invention is not disclosed in Kleijn '151 considered alone or in combination with the teachings of any of the cited references. Therefore, it is urged that the examiner has failed to find references that teach an important claimed feature of the present invention, with respect to claim 1 and its dependent claim 2, with respect to

independent claim 8 and its dependent claims 9-11, and independent claim 12 and its dependent claims 13-14. Accordingly, it is believed that the foregoing argument has overcome the rejections of claims 1-2 and 8-14 under 35 U.S.C. 103, so as to show allowable subject matter in these claims.

The foregoing analysis of the cited art is believed to overcome the rejections of claims 3-5 and 7 under 35 U.S.C. 103 as being unpatentable over Kleijn (US 6,223,151) in view of Griffin (IEEE Publication) and Kleijn (US 5,517,595).

It is noted that Claims 3-5 and 7 depend from claim 1, and that the rejection of these claims is based on the same art as the rejection of claim 1, except for the addition of the additional reference Kleijn '595. The additional reference is employed: for claim 3 to show the obtaining of a normalized pitch cycle by autocorrelation (Point 11 of the Action), for claim 4 to show normalizing the pitch by shifting the time domain discrete values of the residual signal (Point 12 of the Action), for claim 5 to show upsampling of the speech signal by interpolation (Point 13 of the Action), and for claim 7 to show down-sampling of the modified signal prior to encoding (Point 14 of the Action).

These teachings of Kleijn '595, referred to by the examiner, do not show the above-noted feature of the present invention that a speech signal that has been modified for improved periodicity should be used for determination of a voicing parameter. Thus, the combination of these three references still does not show

one where to connect the circuitry of Griffin to the system of Kleijn '151. Accordingly, it is believed that the foregoing argument has overcome the rejections of claims 3-5 and 7 under 35 U.S.C. 103, so as to show allowable subject matter in these claims.

The foregoing analysis of the cited art is believed to overcome the rejections of claims 15-18 under 35 U.S.C. 103 as being unpatentable over Kleijn (US 6,223,151) in view of Griffin (IEEE Publication) and Kleijn (US 5,517,595).

The teachings of Kleijn '151 and of Griffin are employed in the rejection of independent claim 15 in a manner analogous to the employment of these references in the rejection of claim 1. However, the additional teaching of Kleijn '595 is employed by the examiner (Point 16 of the Action, bottom of page 8) to teach a decoding of speech signals using the modified signal. Thus, the combination of these three references still does not show one where to connect the circuitry of Griffin to the system of Kleijn '151.

It is noted that Claims 16-18 depend from claim 15, and that the rejection of these claims is based on the same art as the rejection of claim 15. The reference, Kleijn '151, is employed: for claim 16 to show a network element functioning within a wireless telecommunication network (Point 17 of the Action), for claim 17 to show software operating with a signal processor for generating a residual signal (Point 18 of the Action), and for claim 18 to show a memory with software operating a signal

processor for transforming, estimating and modifying a speech signal (Point 19 of the Action).

The combination of the teachings of Kleijn (US 6,223,151) in view of Griffin (IEEE Publication) and Kleijn (US 5,517,595), referred to by the examiner in the rejection of claims 15-18, do not show the above-noted feature of the present invention that a speech signal that has been modified for improved periodicity should be used for determination of a voicing parameter. Thus, the combination of these three references still does not show one where to connect the circuitry of Griffin to the system of Kleijn '151. Accordingly, it is believed that the foregoing argument has overcome the rejections of claims 15-18 under 35 U.S.C. 103, so as to show allowable subject matter in these claims.

The foregoing analysis of the cited art is believed to overcome the rejection of claim 6 under 35 U.S.C. 103 as being unpatentable over Kleijn (US 6,223,151) in view of Donovan (US 6,266,637). As has been noted above, it is believed that the examiner intended to include the teachings of Griffin in the rejection of claim 6, in view of the dependency of claim 6 from claim 1. Donovan is employed by the examiner (Point 12 of the Action) to teach a pitch scaling algorithm called for by claim 6.

The art cited in the rejection of claim 6 does not show the above-noted feature of the present invention that a speech signal that has been modified for improved periodicity should be

used for determination of a voicing parameter. This art does not show one where to connect circuitry providing a voicing parameter, such as the material disclosed in Griffin Section III (C) (beginning on page 1228), to the system of Kleijn '151. Accordingly, it is believed that the foregoing argument has overcome the rejections of claim 6 under 35 U.S.C. 103. so as to show allowable subject matter in these claims.

CONCLUSION

In conclusion, it is noted that an important aspect of the present invention is the recognition by the present inventor that a speech signal that has been modified for improved periodicity should be used for determination of a voicing parameter. But this specific claimed feature of the present invention is not disclosed in Kleijn '151 considered alone or in combination with the teachings of any of the cited references. While the examiner has referred to Griffin for teaching a voicing parameter, the examiner has not provided a reference showing that, in the use of circuitry for determining a voicing parameter, the parameter is to be determined based on the modified speech signal. Accordingly, it is urged that the arguments presented herein have overcome the grounds of rejection to show the presence of allowable subject matter in the claims. It is requested respectfully that the BOARD OF PATENT APPEALS AND INTERFERENCES reconsider the foregoing grounds of rejection under 35 U.S.C. 103, and find the present claims to be allowable.

The appendix of claims is attached hereto.

A check in the amount of $500.00 is enclosed herewith for the appeal brief fee. The Commissioner is hereby authorized to charge payment for any additional fees associated with this communication or credit any over payment to Deposit Account No. 16-1350.

Respectfully submitted,

Geza C. Ziegler, Jr.
Reg. No.: 44,004

27 May 2005
Date

Perman & Green, LLP
425 Post Road
Fairfield, CT 06824
(203) 259-1800
Customer No.: 2512

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service on the date indicated below as first class mail in an envelope addressed to the Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, Attention: BOARD OF PATENT APPEALS AND INTERFERENCES

Date: 5/27/05

Signature: Doris W. Perna
Person Making Deposit

VIII. CLAIMS APPENDIX

The texts of the claims involved in the appeal are:

1. A method of encoding speech comprising the steps of:

formulating a speech signal from utterances spoken by a speaker;

determining an estimate of periodicity from the formulated signal;

modifying the formulated signal using the periodicity estimate such that the periodicity is improved;

determining at least one voicing parameter based on the modified signal;

deciding the encoding method based on at least one determined voicing parameter; and

encoding the modified signal in a speech encoder.

2. A method according to claim 1 wherein the formulated speech signal is a digitized signal such as a residual signal produced from a coding algorithm such as Linear Predictive Coding (LPC) for the actual speech signal itself.

3. A method according to claim 1 wherein the determining an estimate of periodicity step comprises obtaining a normalized pitch cycle by autocorrelation.

4. A method according to claim 3 wherein the modifying step include normalizing the pitch by shifting the time domain discrete values of the residual signal to conform to the normalized pitch cycle.

5. A method according to claim 4 wherein the modifying step further comprises the speech signal being upsampled by interpolation such that suitable discrete values of the upsampled signal are shifted to conform to the average pitch cycle.

6. A method according to claim 1 wherein a pitch scaling algorithm such as Time Domain Pitch Synchronous Overlap-Add (TD-PSOLA) is used to normalize the pitch cycle lengths in an analysis frame.

7. A method according to claim 5 wherein the modified signal is down sampled prior to encoding in the speech coder.

8. An apparatus for generating a modified signal suitable for use with an speech encoder/decoder comprising:

means for formulating a speech signal from utterances spoken by a speaker;

means for determining an estimate of periodicity from the formulated signal;

means for modifying the formulated signal using the periodicity estimate such that the periodicity is improved;

means for determining at least one voicing parameter based on the modified signal;

means for deciding the encoding method based on at least one determined voicing parameter; and

means for encoding the modified signal in the speech encoder/decoder.

9. An apparatus according to claim 8 wherein the formulating means includes software operating with a signal processor that is capable of generating a residual signal from a speech signal.

10. An apparatus according to claim 8 wherein the apparatus includes a memory comprising a software operating with a signal processor for providing means for transforming, estimating, and modifying the speech signal.

11. An apparatus according to claim 8 wherein the apparatus is integrated into a mobile device.

12. A mobile device comprising:

a speech coder;

means for formulating a speech signal from utterances spoken by a speaker;

means for determining an estimate of periodicity from the formulated signal;

means for modifying the formulated signal using the periodicity estimate such that the periodicity is improved;

means for determining at least one voicing parameter based on the modified signal;

means for deciding the encoding method based on at least one determined voicing parameter; and

means for encoding the modified signal in the speech coder.

13. A mobile device according to claim 12 wherein the formulating means includes software operating with a signal processor that is capable of generating a residual signal from a speech signal.

14. A mobile device according to claim 12 wherein the mobile device includes a memory comprising a software operating with a signal processor for providing means for transforming, estimating, and modifying the speech signal.

15. A network element comprising:

means for formulating a speech signal from utterances spoken by a speaker;

means for determining an estimate of periodicity from the formulated signal;

means for modifying the formulated signal using the periodicity estimate such that the periodicity is improved;

means for determining at least one voicing parameter based on the modified signal;

means for deciding the encoding method based on at least one determined voicing parameter; and

means for encoding and decoding speech signals using the modified signal.

16. A network element according to claim 15 integrated into a radio base station functioning within a wireless telecommunication network.

17. A network element according to claim 15 wherein the formulating means includes software operating with a signal processor that is capable of generating a residual signal from a speech signal.

18. A network element according to claim 15 wherein the mobile device includes a memory comprising a software operating with a signal processor for providing means for transforming, estimating, and modifying the speech signal.

IX EVIDENCE APPENDIX

There is no evidence appendix.

X RELATED PROCEEDINGS APPENDIX

There is no related proceedings appendix.

XI CERTIFICATE OF SERVICE

There is no certificate of service.

APPLICANT'S REPORT ON SUBSTANCE OF INTERVIEW

An interview was conducted by telephone on April 11, 2005 between Examiner Vo and applicant's representative David Warren. There was discussion of the reference Kleijn (US 6,223,151) and Griffin (IEEE Publication) with respect to claim 1 and other ones of the independent claims reciting the inventive features of modifying a signal and encoding the modified signal based on a parameter of the signal. The independent claims where rejected on a combination of the teachings of Kleijn and Griffin.

At the interview, it was pointed out to the examiner that Kleijn modified a signal to provide a block of a generally sinusoidal signal in which a front end and a back end of the signal block had reduced power while, in a center of the signal block, there was located a pitch pulse. In contrast, in the present invention, the modified signal is a sinusoid with improved periodicity as compared to the original signal wherein periodicity may have been corrupted by jitter.

It was pointed out also that Griffin distinguished between voiced and unvoiced signals, and obtained accurate estimates of the pitch of each of a plurality of harmonics, and then coded individual ones of the harmonics based on a voiced or unvoiced part of speech. There was no teaching in Griffin of coding based on a voicing parameter as described on page 2 of the present specification.

The examiner said that a more detailed description of the terms "modifying" and "parameters", particularly "modifying", would be required to distinguish over the art. Without such further description in the claims, the claims must be regarded as reading on the cited art and accordingly rejected.

Even though it was pointed out to the examiner that Kleijn modified his signal in a different fashion than the modification of the present invention (Kleijn modified the power at the opposite ends of the signal block and inserted a pitch pulse in the center of the block, while the present invention obtained improved periodicity), the examiner would not alter his position. He stated that if the Applicant would provide in the claims additional description of what the invention did to accomplish the modifying, thereby to distinguish the modifying process of Kleijn from the modifying of the present invention, then the claims would be allowable.